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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁴ : B43K 8/00, B43L 19/00 C09D 5/48	A1	(11) International Publication Number: WO 87/ 01338 (43) International Publication Date: 12 March 1987 (12.03.87)
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(21) International Application Number: PCT/GB86/00528

(22) International Filing Date: 4 September 1986 (04.09.86)

(31) Priority Application Number: 8521957

(32) Priority Date: 4 September 1985 (04.09.85)

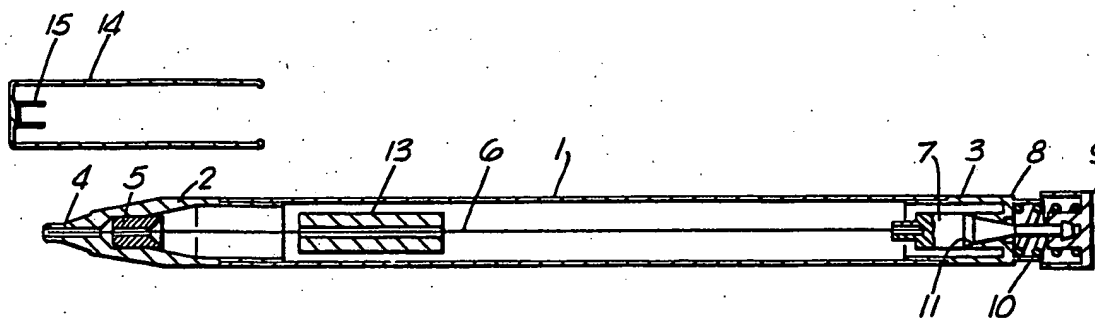
(33) Priority Country: GB

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London WC2R 0AE (GB).(81) Designated States: AT (European patent), AU, BE (Eu-
ropean patent), BG, BR, CF (OAPI patent), CG (OA-
PI patent), CH (European patent), CM (OAPI patent),
DE (European patent), DK, FI, FR (European pa-
tent),GA (OAPI patent), GB, GB (European patent), HU,
IT (European patent), JP, KP, KR, LU (European pa-
tent), MG, ML (OAPI patent), MR (OAPI patent),
MW, NL (European patent), NO, RO, SD, SE (Euro-
pean patent), SN (OAPI patent), SU, TD (OAPI pa-
tent), TG (OAPI patent), US.

Published

*With international search report.
Before the expiration of the time limit for amending the
claims and to be republished in the event of the receipt
of amendments.*

(54) Title: DISPENSER FOR A LIQUID CONTAINING VOLATILE COMPONENT



(57) Abstract

A dispenser for applying correction fluid to documents to be corrected is in the general form of a pen with a nib body (2) at one end having an outlet duct (4) through which the fluid is dispensed. At the opposite end there is a valve operated by a push-button (9) for equalising the pressure inside and outside the container body (1) of the dispenser and attached to the valve is a rodding wire (6) that extends axially through the pen to the outlet. The valve is normally biased to the closed position and when the push-button is depressed the valve opens and at the same time the rodding wire dislodges any fluid that may have solidified in the outlet. The correction fluid used in the dispenser has toluol as its volatile solvent component and major parts of the dispenser are moulded in nylon which is resistant to toluol.

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Dispenser for a liquid containing volatile component

This invention relates to fluid dispensers, in particular for dispensing typewriter correction fluids and like liquids containing a volatile component.

Correction fluids used by typists and other office staff to obliterate errors in documents must have a high opacity, should be quick drying and should be flexible when dry. Those criteria are met by available correction fluids which are in the form of fairly viscous liquids applied by brush from a bottle and contain a volatile solvent that evaporates very rapidly.

However, the existing use of bottle-and-brush can be messy and wasteful since a mass of solidified material tends to build up around the mouth of the bottle and the stem of the brush and the fluid remaining in the bottle may gradually solidify until it is too hard to use. Also, a brush is a comparatively imprecise means of application. One attempt at least has been made to produce a correction fluid container that is also an applicator which can be used to 'blob' the fluid directly on to the document to be corrected but it was not successful. A particular problem with such an applicator is that the fluid is dispensed through a narrow passageway which tends to become blocked with solidified fluid, after which the applicator cannot effectively be used.

PCT Patent Specification No. PCT/GB 85/00122 discloses a dispenser for a low viscosity correction fluid comprising

a correction fluid container, an outlet from the container through which fluid is dispensed, a member movable within the outlet by manipulation of the dispenser by the user to initiate dispensing of the correction fluid, and an inlet
5 for supplying air to the container to replace dispensed fluid. The movable member is in the form of a wire which extends through a tube into the outlet, and the wire is connected to a button at the end of the dispenser remote from the outlet. Depression of the button causes the wire to slide
10 in the outlet, dislodging any hardened correction fluid left therein and thereby enabling the dispensing of fresh fluid. Air enters the container through the inlet to replace fluid dispensed through the outlet. The inlet is sealed by an air-tight cap when the dispenser is not in use. The rate of flow
15 of fluid through the outlet is determined by the dimensions of a restricted passage partially blocked by a reticulated foam pad.

It has been found that if a user forgets to replace the the air-tight cap between uses of the dispenser, fluid can
20 dry out. Furthermore, the reticulated foam pad can become clogged, particularly if the fluid viscosity rises as a result of partial drying out.

It is therefore an object of the invention to provide an improved fluid dispenser for this duty.

25 According to the present invention, there is provided a dispenser for a fluid containing a volatile component, the dispenser comprising a fluid container, an outlet from the container from which fluid is dispensed, a member movable

within the outlet by manipulation by the user to clear the outlet for the dispensing of the fluid, and an inlet for supplying air to the container to replace dispensed fluid, wherein the inlet is sealed by a valve which is biased to a closed position but which may be opened by the user, the valve automatically returning to the closed position when released by the user.

Preferably, the valve is connected to the movable member such that opening of the valve automatically clears the dispenser outlet and simultaneously equalises the pressures inside and outside the container.

As to the composition of the correction fluid with which the dispenser is to be filled, the correct choice of volatile solvent is particularly important. Both toluol and trichlorethane have the right vapour pressure and evaporate quickly; but toluol is much to be preferred because trichlorethane is hazardous to use in manufacture. Advantageously, toluol is employed in co-operation with a dispenser having plastics components moulded in nylon, since it was found that nylon is resistant to toluol whereas other plastics tested were not.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is a diagrammatic longitudinal section through a dispenser embodying the invention,

Figures 2 to 6 are longitudinal sections through various components of the dispenser as manufactured, being

respectively, the dispenser casing, a nib body at one end, a cap for the nib body, a push-button at the opposite end for actuating a valve member and a rodding wire, and a steel insert lodged in the nib body, and

5 Figure 7 shows the valve member in external side elevation.

Referring to the drawings, the dispenser comprises a tubular casing 1 supporting a nib body 2 at one end and a valve housing 3 at the other end. The nib body 2 is a coaxial extension of the casing 1, being of hollow circular section, and tapers toward an outlet 4. A tubular metal insert 5 is
10 lodged coaxially within the nib body 2 defining a capillary bore of 0.71 mm diameter through which passes a rodding wire 6 of 0.65 mm diameter that extends also within the outlet 4.

15 The valve housing forms a hollow tubular extension on the opposite end of the casing 1 and embodies a coaxial inlet 8 defining an internal valve seat 11. The rodding wire 6 extends along the axis of the tubular casing 1 and is secured at that opposite end to a movable valve member 7
20 mounted coaxially in the valve housing 3 to co-operate with the valve seat 11 and having a stem 7 extending out through the inlet 8. The outer end of the valve stem is secured to a cap 9, forming a push-button, which is biased axially away from the valve housing 3 by a compression spring 10.
25 The valve member 7 and the valve seat 11 have mating frusto - conical surfaces.

The correction fluid contents within the casing 1 can be stirred and mixed by shaking the dispenser to agitate a loose

annular body 13 disposed within the casing around the wire 6. A cap 14 is provided for placing over the nib body 2 when the pen is not being used.

When it is intended to use the dispenser, it is first shaken and is then held nib downward and the push-button 9 depressed once or several times and released. This causes the wire 6 to protrude through the outlet 4, dislodging any blockage caused by dried fluid. It also opens the valve 7 and thereby ensures that the pressure within the dispenser is equalised to the pressure of the surrounding air. This equalisation of pressure is important.

With the cap 14 removed, the dispenser can then be placed with the nib outlet in contact with the document to be corrected and used like an ordinary pen, the correction fluid passing through the clearance between the metal insert tube 5 and the wire 6. As fluid is dispensed, capillary action and surface tension tend to maintain the flow, but the pressure gradually falls within the dispenser until eventually no further fluid can flow. If further use of the dispenser is required the user simply presses the cap 9 again to equalise the pressures. Dripping or blobbing is avoided by the fact that during use the valve 7 is closed.

If after use the user forgets to replace the cap 14 the fluid within the outlet solidifies and further loss of the volatile component of the fluid is prevented. When the dispenser is to be used again the blockage in the outlet 4 is simply removed by pressing the button 9. Opening of the

valve 7 is kept to a minimum and as a result substantial loss of solvent is avoided.

By carefully gauging the clearance between the tubular metal insert 5 and the wire 6 and matching this clearance to the viscosity of the fluid to be dispensed and the desired rate at which the fluid should be dispensed, the "writing" characteristics of the dispenser can be determined.

Whereas the showing of the dispenser in Figure 1 is diagrammatic, Figures 2 to 7 show parts of the dispenser as actually manufactured. The casing 1 in Figure 2 is moulded in nylon and has the valve housing 3 formed as an integral part of the casing, the valve seat 11 being carried by a frusto-conical internal diaphragm 16. The nib 2 in Figure 3 is also of nylon, as are the nib cap 14 in Figure 4 and the valve push-button 9 in Figure 5. It can be seen that the nib cap 14 has an internal socket 15 within which the outlet end portion of the nib body 2 is a snug fit.

The metal nib insert 5 shown in Figure 6 is of pressed steel, part cylindrical and part frusto-conical in form. The valve member 7 in Figure 7 is of brass and has at the outer end of its stem 17 a head 18 which is a snap fit into a socket 19 in the push button 9. At its opposite end within the casing 1 the valve member has a socket 20 to receive the end of the rodding wire 6. The annular agitating body 13 within the casing, also of metal, can be fairly long, externally grooved and, if desired, tapered at one end to readily enter the tapering nib body 2.

The composition of the correction fluid used in the dispenser can be as follows:-

	<u>% Weight</u>
5	
Binder Resin	3.96
Plasticiser	0.10
Surfactant	0.40
Pigments	56.04
10	
Suspending Agents	5.90
Solvent	33.60

Suitable binder resins are found amongst vinyl chloride polymers, acrylic polymers, vinyl chloride/vinyl ether copolymers and acrylic/styrene copolymers, with the preferred binder being a vinyl chloride/vinyl ether copolymer having a low viscosity range and available under the Trade Mark 'Laroflex'.

Suitable plasticisers are found amongst chlorinated paraffins, low molecular weight esters of isophthalic and phthalic acids, and epoxidised fatty acid esters.

An epoxidised fatty acid ester, such as methyl ethyl ketone, is the preferred plasticiser, giving the required flexibility and adhesion without loss of hardness of the film.

The surfactant acts as a wetting agent and suitable wetting agents are found amongst the naturally occurring long chain esters or soaps.

A suitable pigment can be based on titanium dioxide,

selecting a blue/white grade made by the chloride process.

Suitable suspending agents are found amongst magnesium alumino silicates, hydrogenated castor oils and inorganic platelet fillers.

5 Preferably, a platelet filler, such as talc, is employed.

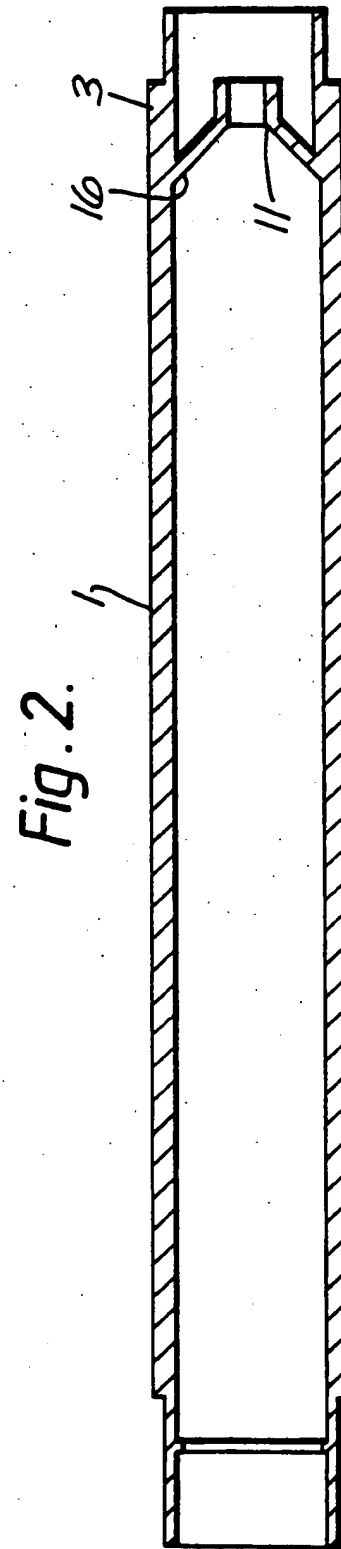
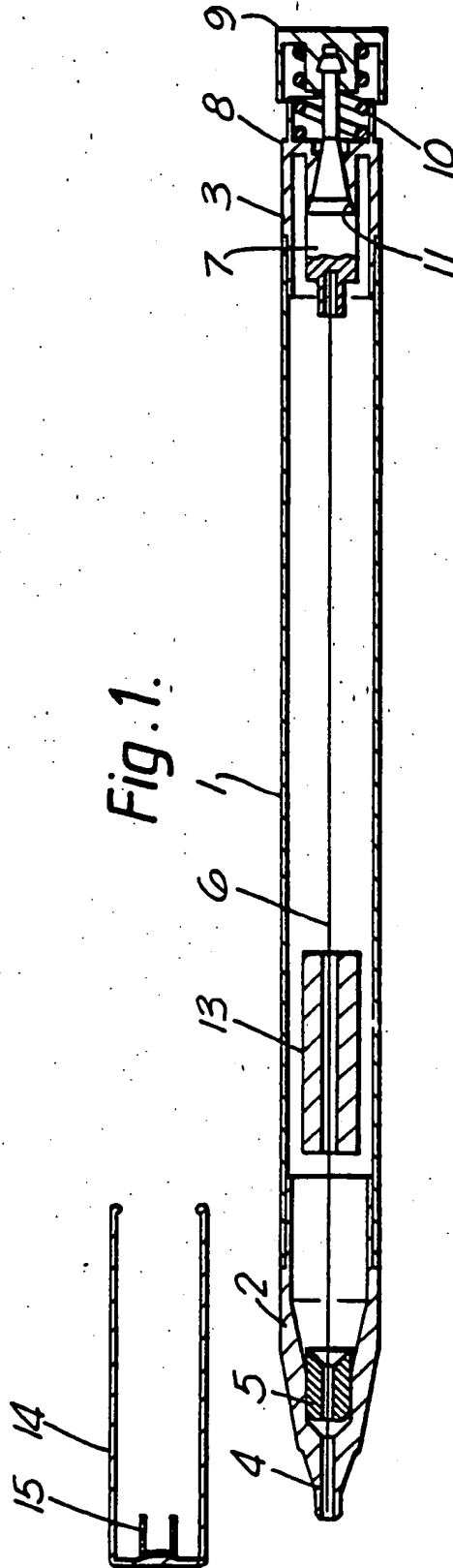
The choice of the volatile solvent is particularly important. Usable solvents are found amongst low molecular weight alcohols, alkyl benzenes and chlorinated
10 hydrocarbons. However, an alkyl benzene is preferred, of which toluol is particularly recommended.

CLAIMS

1. A dispenser for a fluid containing a volatile component, comprising a fluid container and an outlet from the container from which fluid is dispensed, a member movable within the outlet by manipulation by the user to
5 clear the outlet for the dispensing of the fluid, and an inlet for supplying air to the container to replace dispensed fluid, wherein the inlet is sealed by a valve which is biased to a closed position but which may be opened by the user, the valve automatically returning to the closed
10 position when released by the user.
2. A dispenser according to Claim 1, wherein the valve is connected to the movable member whereby concurrently with the opening of the valve to equalise the pressures inside and outside the container the dispenser outlet is cleared.
- 15 3. A dispenser according to Claim 1 or Claim 2, wherein the container is a generally cylindrical elongated casing, the outlet is provided in a nib body at one end of the casing, the valve is situated at the opposite end of the casing and is operated by a push-button at that end, and the
20 movable member is in the form of a rodding wire extending axially through the casing with one end secured to the valve and the other end disposed in the nib body outlet.
4. A dispenser according to Claim 3, wherein the
25 rodding wire passes through an annular metal insert within the nib body whereby a capillary passage for the fluid is defined within the bore of the insert around the wire.

5. A dispenser according to Claim 3 or Claim 4, wherein an annular agitating body is disposed loosely within the casing surrounding the rodding wire whereby fluid in the casing can be mixed or stirred by shaking the dispenser.
6. A dispenser according to Claim 3 or Claim 4 or Claim 5, wherein a removable cap is provided to fit over the nib body which cap has an internal socket within which the outlet end of the nib body is a snug fit.
7. A dispenser according to any one of Claims 3 to 6, filled with a correction fluid containing toluol as a volatile solvent component, and wherein one or more moulded plastics parts of the dispenser in contact with the fluid are made of nylon.
8. A dispenser according to Claim 7, wherein the components of the correction fluid are substantially as set out in the table herein.
9. A dispenser according to Claim 8, wherein the binder resin in the correction fluid is a vinyl chloride/vinyl ether copolymer.
10. A dispenser according to Claim 8 or Claim 9, wherein the plasticiser in the correction fluid is methyl ethyl ketone.

1/2



2/2

Fig. 3.

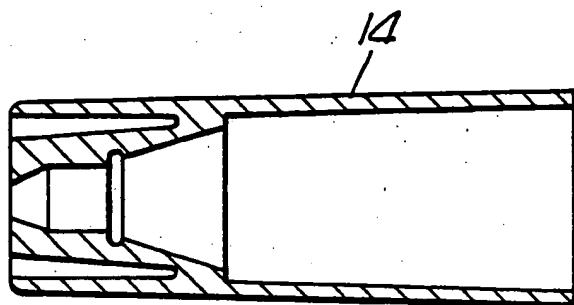
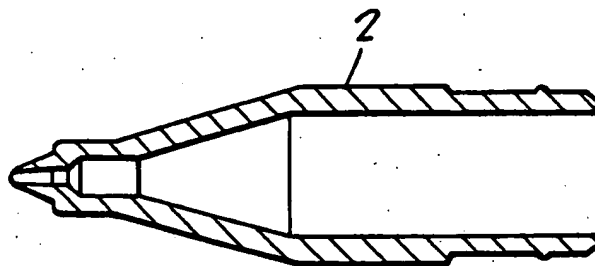


Fig. 4.

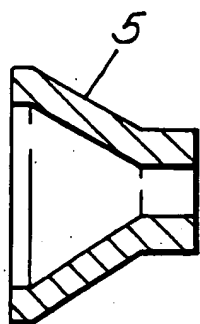


Fig. 6.

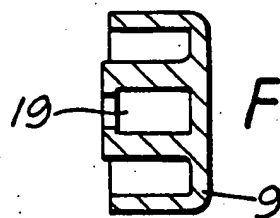
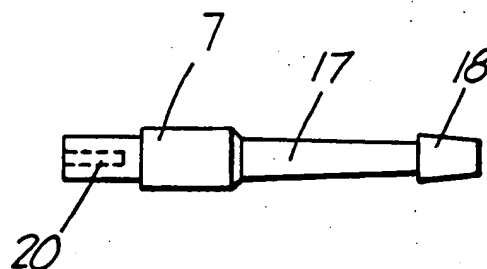


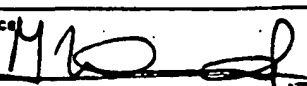
Fig. 5.

Fig. 7.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 86/00528

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC ⁴ : B 43 K 8/00; B 43 L 19/00; C 09 D 5/48		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC ⁴	B 43 L B 43 K B 43 M	
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
X	US, A, 3467477 (LITZKA) 16 September 1969 see column 2, line 65 - column 3, line 27; column 5, line 32 - column 6, line 50	1-4
Y	--	5-10
Y	DE, A, 1903496 (PILIKAN-WERKE) 13 August 1970 see page 3, lines 4-10	5
Y	NL, A, 7008747 (BOK) 17 December 1971 see page 2, line 28 - page 4, line 14	6
X	GB, A, 162522 (ALEXANDER) 26 May 1921 see page 1, line 63 - page 2, line 27	1-4
A	US, A, 3756729 (TUFTS) 4 September 1973	
A	DE, C, 24213 (COUSTE) 2 October 1883	
Y	US, A, 3276870 (BITTING et al.) 4 October 1966	
./.		
<p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"A" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
22nd October 1986	28 JAN 1987	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	M. VAN MCL 	

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

	see column 2, line 55 - column 4, line 75 --	7-10
A	WO, A, 83/01600 (THE GILETTE COMPANY) 11 May 1983 see page 6, line 30 - page 7, line 3 --	7
A	DE, A, 3306168 (PRO BURO GmbH) 23 August 1984 see page 6, lines 1-2; page 8, lines 8-26 --	7,8
A	US, A, 4165988 (PAGE et al.) 28 August 1979 see column 2, line 53 - column 4, line 41 --	8
	./..	

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☒ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This International Searching Authority found multiple inventions in this international application as follows:

Claims 1-6 : Dispenser
Claims 7-10: Correction fluid

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

☒ The additional search fees were accompanied by applicant's protest.

☐ No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	US, A, 3756514 (BROWN) 4 September 1973 see column 1, line 55 - column 2, line 1 ---	7,8
A	US, A, 3997498 (REESE et al.) 14 December 1976 see column 2, line 1 - column 3, line 12 -----	9

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 86/00528 (SA 14418)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 13/01/87

The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3467477	16/09/69	None	
DE-A- I903496	13/08/70	None	
NL-A- 7008747	17/12/71	DE-A- 2129714	23/12/71
GB-A- 162522		None	
US-A- 3756729	04/09/73	None	
DE-C- 24213		None	
US-A- 3276870		None	
WO-A- 8301600	11/05/83	AU-A- 1040583	18/05/83
		EP-A- 0093161	09/11/83
		CA-A- 1197216	26/11/85
		US-A- 4511273	16/04/85
DE-A- 3306168	23/08/84	EP-A- 0119506	26/09/84
US-A- 4165988	28/08/79	None	
US-A- 3756514	04/09/73	None	
US-A- 3997498	14/12/76	CA-A- 1064638	16/10/79

For more details about this annex :
see Official Journal of the European Patent Office, No. 12/82